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ENVIRONMENTAL MANAGEMENT, INC.

September 4, 2002
Project B30-01H

Mr. Don Petit
Oregon Department of Environmental Quality
2020 NW Fourth Avenue, Suite 400
Portland, Oregon 97201-4987

Re: Interim Remedial Action Measures Proposal
Kinder Morgan Linnton Terminal Remedial Investigation
DEQ File No. WPMVC WMVC-NWR-00-17
11400 NW St. Helens Road
Portland, Oregon

Dear Mr. Petit:

A Remedial Investigation (RI) is ongoing at the Kinder Morgan Liquid Terminals, LLC (KMLT) Linnton Terminal. This proposal for an Interim Remedial Action Measure (IRAM) has been prepared based on the initial findings of the RI. On behalf of KMLT, KHM Environmental Management, Inc. (KHM) is submitting this IRAM proposal to the Oregon Department of Environmental Quality (DEQ) as part of Voluntary Agreement No. WPMVC-WMCVC-NWR-00-17, dated May 24, 2000. The KMLT site is located at 11400 NW St. Helens Road in Portland, Oregon (Figure 1).

The consideration for Interim Remedial Action Measures (IRAM) has been initiated due to the presence of separate-phase petroleum hydrocarbons (SPH) measured in groundwater monitoring wells located near the site boundary with the Willamette River and the visual observation of sheen on the river adjacent to the site.

SITE DESCRIPTION

SITE SETTING

The subject site is a KMLT bulk fuel storage and distribution facility located in the northeast quarter of Section 3 Township 1 North, Range 1 West (Figure 1). The subject site lies between Northwest St. Helens Road to the west and the Willamette River to the east in Portland, Oregon (Figure 2). According to the Multnomah County Tax Assessor, the site consists of two lots; one lot is approximately 13 acres and a second lot is

approximately 0.13 acres. The site is slightly inclined toward the Willamette River, with a steep embankment at the shoreline of the river.

PHYSICAL CHARACTERISTICS OF IRAM AREA

Visual observations of sheen on the Willamette River adjacent to the site generally correspond to an area riverward, spanning from piezometer P-5 to exploration boring RF-2 (approximately 150 feet along the riverbank) (Figure 2). Sheen has sporadically been observed another 100 feet downriver, between RF-2 and MW-2. Sheen is noted during periods of higher river stage during the wet winter months or high reservoir release periods. Soil, groundwater, and sediment assessments in the area near the observed seeps consist of sampling at upland locations MW-2, MW-10, P-5, and RF-1 to RF-4. In-river sampling in the area of the seeps consist of sampling at S-2, SED-3, SEEP-3, and SEEP-4 locations. SPH has been measured in recent groundwater monitoring events in site monitoring wells MW-2, MW-3, MW-10, MW-11, P-4 and P-5.

As part of the RI, push-probe explorations RF-1 through RF-3 were completed along the riverfront area. Based on these results, the highest zone of Total Petroleum Hydrocarbon (TPH) concentrations are observed between 10 and 25 feet below grade. The TPH present in this area is predominately characterized by laboratory analytical testing as diesel, with minor components of fuel oil No. 2 and gasoline range hydrocarbons. The average TPH concentration in this area is approximately 4,000 milligrams per kilograms (mg/kg) based on the upland assessment results.

The subsurface geology in the proposed IRAM area generally consists of a thin layer of gravel underlain by a silty sand (dredged fill) layer approximately 20-25 feet thick. A silty sand layer exists beneath the fill unit. The thickness of the silt layer onsite has not been explored. Figure 4 presents a geologic cross-section of the riverfront area. Depth to groundwater in the upland monitoring wells MW-2, MW-10, and P-5 has been measured ranging from approximately 14.5 feet to 18.5 feet.

IRAM AREA

After considering the data from site monitoring well sampling, the observed occurrences of sheen adjacent to the site, and the data from the riverfront probes completed during the RI, the proposed IRAM area was determined to be approximately 250 feet wide along the riverfront (extending from approximately 30 feet upriver of P-5 to 30 feet downriver of RF - 2) (Figures 3). Also the proposed IRAM area extends approximately 250 feet upland (from the riverfront to near sample location HA-2). The vertical extent of the treatment area is considered to be between 10 feet to 25 feet below the ground surface.

INTERIM REMEDIAL ACTION MEASURES OBJECTIVES

The primary objective of the IRAM is the on-site containment, removal, or destruction of the petroleum hydrocarbon source that results in the sheen on the Willamette River. Successful achievement of this objective will be demonstrated by the elimination of an observed sheen on the Willamette River adjacent to the IRAM area.

PROPOSED IRAM ALTERNATIVE

We propose a phased IRAM approach consisting of installation of a series of recovery wells, assessment for the presence of SPH, and utilization of either hydraulic containment or SPH recovery as the means of containment and removal. We believe that the proposed approach allows the IRAM to be tailored to location specific conditions at the IRAM area. Initial field activities and monitoring of MW-10 did not suggest that SPH was present upgradient of the riverfront sheen area, however, the recent observation of SPH in MW-10 might suggest otherwise. If similar conditions are observed in the riverfront area, the phased approach will allow appropriate tailoring of the IRAM.

According to this proposal, both hydraulic containment and SPH recovery are implemented using a network of recovery wells. Installation of equipment for hydraulic containment and SPH recovery can be readily accomplished once the wells are installed, and then an evaluation can be made whether or not SPH recovery is needed. If appreciable SPH is measured in one or more of the proposed recovery wells, then the initial IRAM activities would focus on installing an SPH recovery system to reduce the SPH in this area. Should minor or no SPH be present in the proposed recovery wells, then the IRAM will focus on the hydraulic containment. Additionally, this approach will facilitate easy expansion to other existing wells (e.g. MW-2 or others) as necessary.

Hydraulic containment would utilize groundwater extraction and treatment (pump-and-treat) technology to create hydraulic containment near the area of active sheen. Groundwater would be extracted from the extraction wells, providing a cone of groundwater depression (influence) that would contain SPH and prevent it from flowing toward the seeps. Extracted groundwater would be treated by oil-water separation, air-stripping of volatile components, activated carbon adsorption, or other treatment technologies. Treated water would be discharged according to the limitations of an applicable National Pollution Discharge Elimination System (NPDES) permit.

SPH recovery systems are typically designed to recover product, not groundwater, using floats to maintain the pump inlet at the groundwater surface, density separation, or using hydrophobic filters that allow for product to enter but exclude water. The SPH recovery pumps would be placed in the newly installed riverfront recovery wells. Recovered SPH

would be temporarily stored in an appropriate storage tank and routinely transported off-site for recycling or disposal.

IMPLEMENTATION OF PROPOSED IRAM ALTERNATIVE

The proposed IRAM will be implemented in three Phases; allowing for the nearly immediate start of implementation, as described below.

Phase I – Recovery Well Installation and Decision Making

Phase I of the IRAM implementation would consist of installation of five recovery wells inline between MW-2 and MW-10 (Figure 2), providing a well spacing of approximately 35 feet on-center between these two existing monitoring wells. These proposed recovery wells will be used to assess the presence of appreciable SPH along the riverfront in the proposed IRAM area, and for future IRAM activities. The proposed wells will be completed as 4-inch diameter wells to depths of approximately 30 feet below grade. Additionally, MW-2 (existing) is a 4-inch well and is available for use as a recovery well, if needed.

Following DEQ's approval of this IRAM proposal, KHM anticipates completing the installation of the five recovery wells (Figure 2) within 30 days. Assessment of SPH thickness and the decision regarding SPH recovery or hydraulic containment will be completed within three weeks following the development of the proposed wells. Once the initial assessment of SPH thickness is completed, it is anticipated that a discussion with DEQ will occur to achieve consensus regarding the implementation of SPH recovery and/or groundwater recovery. Implementation of either alternative will be initiated immediately upon achieving consensus with the DEQ and then obtaining the necessary permits and equipment.

Phase II - Recovery System Installation

Phase II of the IRAM implementation will consist of the design and installation of a recovery system. A technical memorandum will be provided to the DEQ regarding the proposed recovery system design and schedule for implementation. Depending on the type of recovery system selected, discharge of treated water may be required. Because of the permit exemption afforded by the voluntary agreement for remedial investigation of the site, we understand that the DEQ is willing to facilitate discussions with its internal water quality program and direct KMLT accordingly to ensure that all discharges are conducted and communicated in accordance with the limitations and requirements of an applicable NPDES permit.

Phase III - IRAM Source Area Assessment

Assessment data landward of the riverfront in the proposed IRAM area is limited due to the presence of containment walls and above-ground piping that restrict access to the site.

KMLT is currently reviewing possible approaches to perform soil and groundwater assessment activities in this limited access area. Following the installation and development of the five recovery wells along the riverfront in the proposed IRAM area, a technical memorandum will be submitted to the DEQ describing the proposed assessment activities and a figure showing the proposed boring locations in the proposed IRAM area.

IRAM Proposal Approval Request

KHM, on behalf of KMLT, is seeking DEQ approval to proceed with the implementation phase of the IRAM as presented in this document.

The services described in this report were performed in accordance with generally accepted professional consulting principles and practices. No other warranty, either expressed or implied, is made. These services were performed in accordance with terms established with our client, Kinder Morgan. This report is solely for the use of our client and reliance on any part of this report by a third party is at such party's sole risk.

Please contact either of the undersigned if you have any questions regarding this letter.

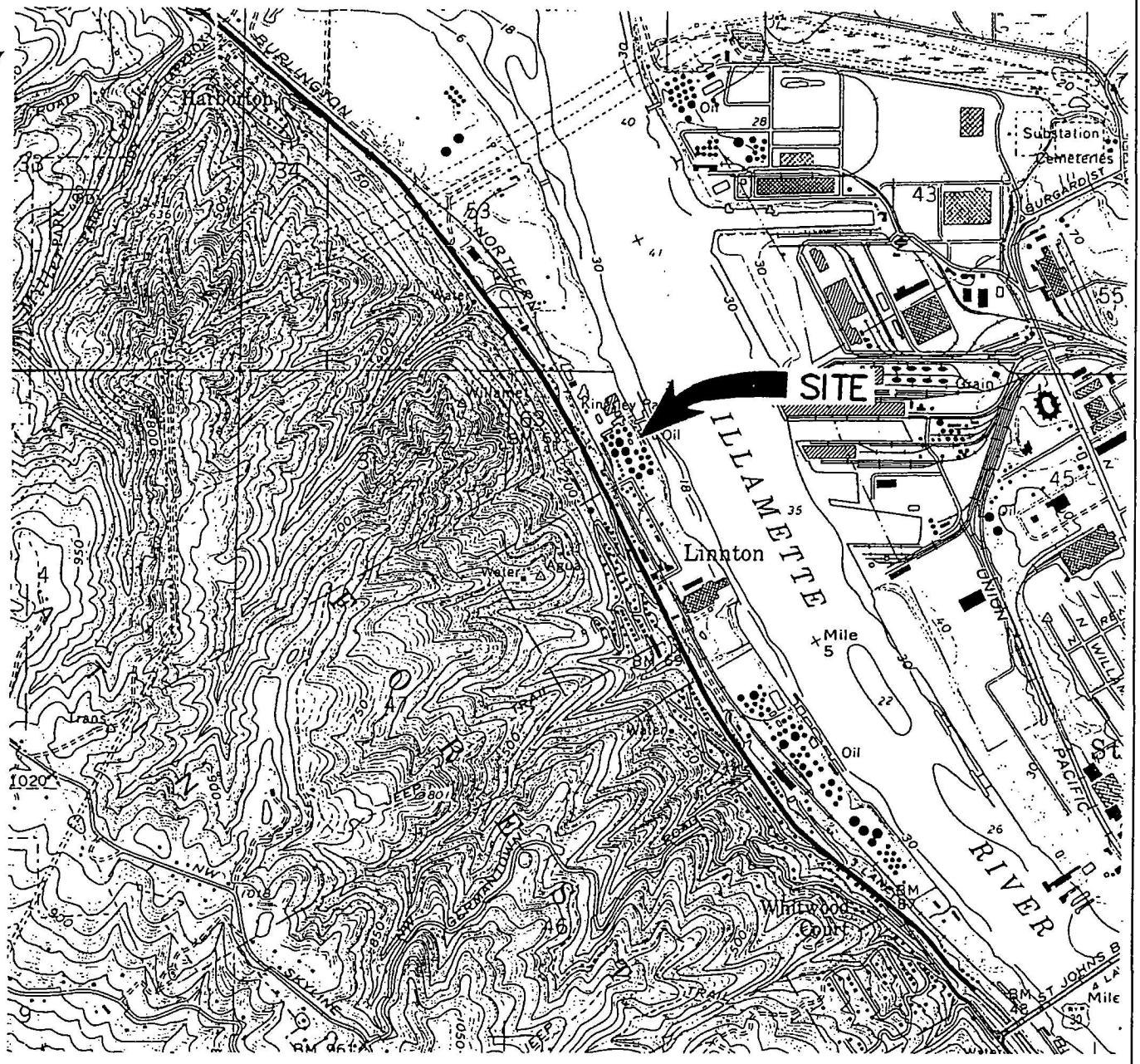
Sincerely,
KHM Environmental Management, Inc.

Kelly Kline, R.G.
Senior Project Geologist

Scott Miller, P.E.
Principal Engineer

Attachments: Figure 1 - Site Location Map
Figure 2 - Site Plan
Figure 3 - Proposed Well Locations/IRAM Area
Figure 4 - Cross Section of River Front Area

cc: Mr. Steve Osborn, Kinder Morgan Energy Partners, Orange, California
Mr. John Foxwell, GeoEngineers, Inc., Portland, Oregon



REFERENCES

USGS 7.5 Minute Topographic Map
Linnton, Oregon, 1961
Photorevised 1984

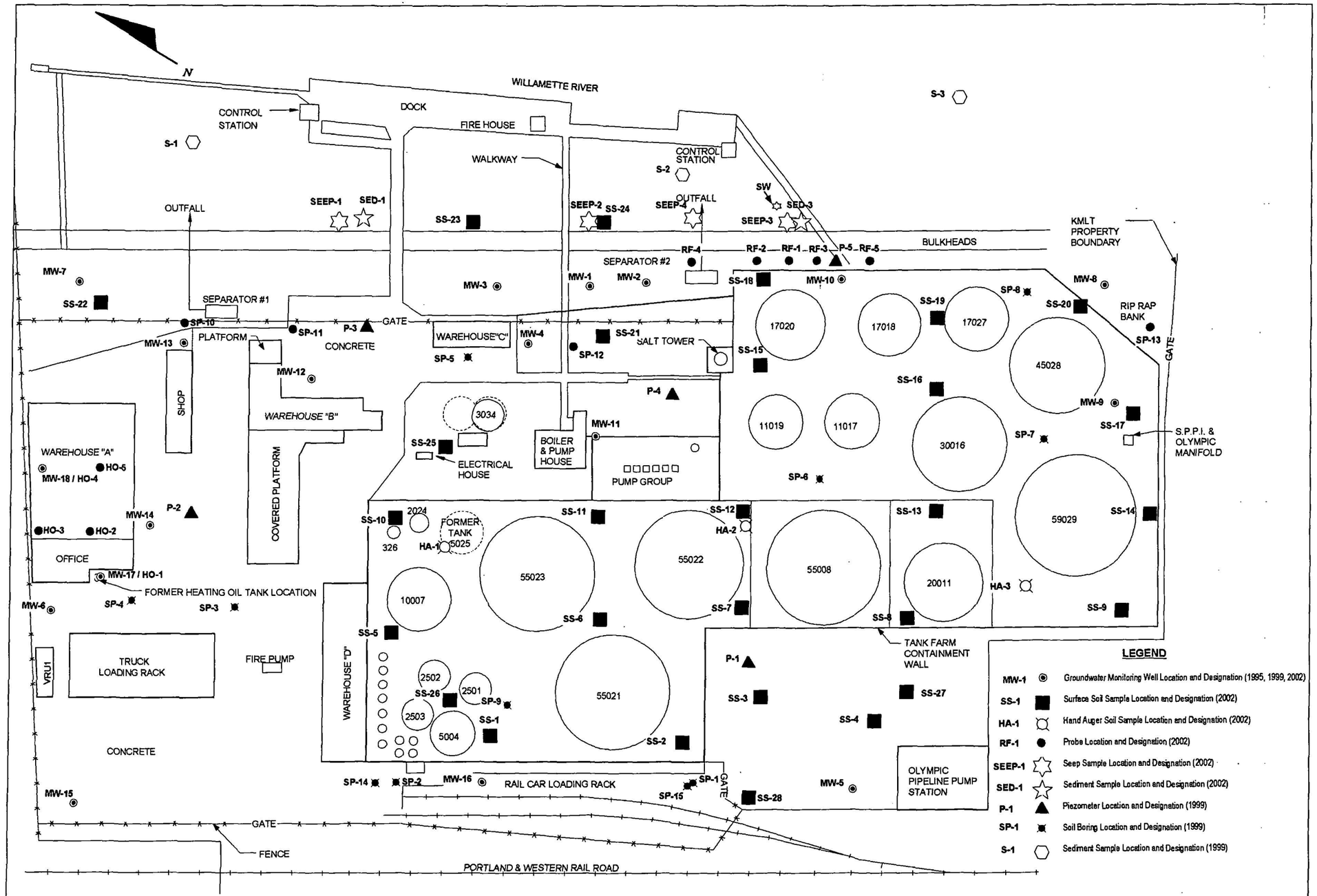
SCALE: 1:25,000

KHM ENVIRONMENTAL MANAGEMENT INC.

TITLE: Site Location Map

Kinder Morgan Liquid Terminals, LLC
Linnton Terminal
11400 NW St. Helens Road
Portland, Oregon

DATE	PROJECT	FIGURE
10/02/01	B30-01H	1



LEGEND

MW-1	Groundwater Monitoring Well Location and Designation (1995, 1999, 2002)
SS-1	Surface Soil Sample Location and Designation (2002)
HA-1	Hand Auger Soil Sample Location and Designation (2002)
RF-1	Probe Location and Designation (2002)
SEEP-1	Seep Sample Location and Designation (2002)
SED-1	Sediment Sample Location and Designation (2002)
P-1	Piezometer Location and Designation (1999)
SP-1	Soil Boring Location and Designation (1999)
S-1	Sediment Sample Location and Designation (1999)

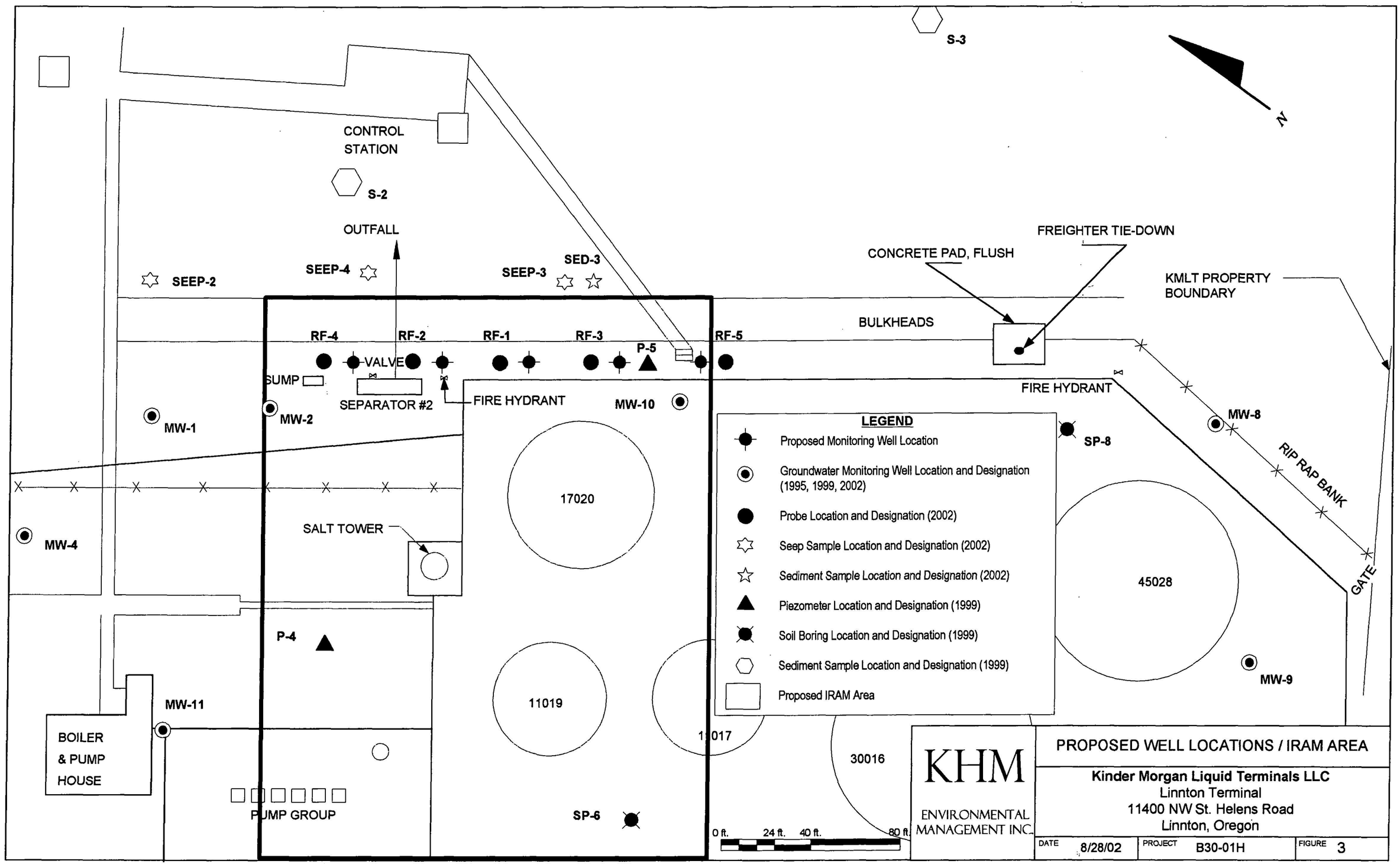
KHM ENVIRONMENTAL MANAGEMENT INC.

DESIGNED BY
DRAWN BY
CHECKED BY
APPROVED BY

SITE MAP WITH SAMPLE LOCATIONS

Kinder Morgan Liquid Terminals LLC
Linnton Terminal
11400 NW St. Helens Road
Portland, Oregon

DATE	PROJECT	DRAWING
8/28/02	B30-01H	2

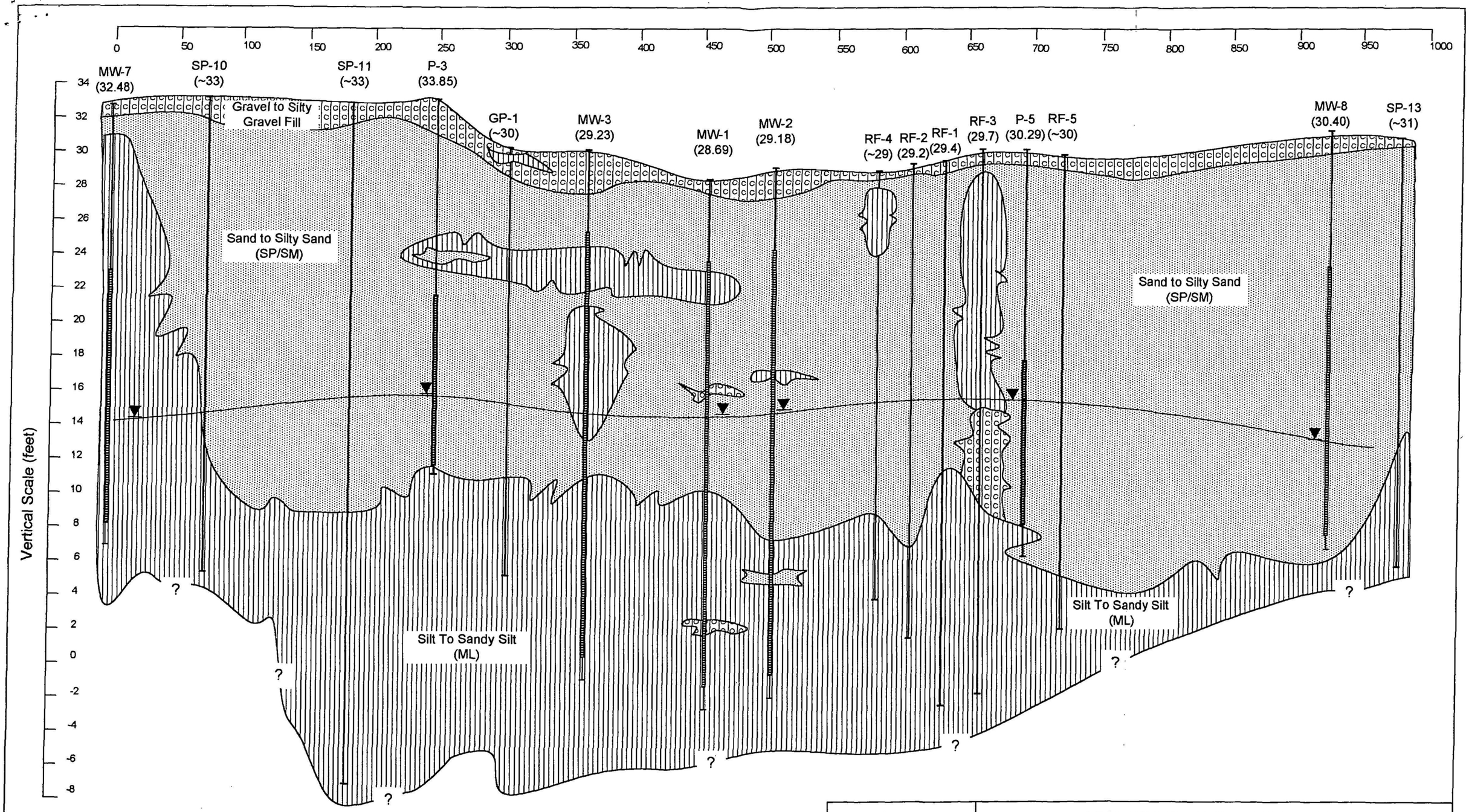


KHM
ENVIRONMENTAL MANAGEMENT INC.

PROPOSED WELL LOCATIONS / IRAM AREA

Kinder Morgan Liquid Terminals LLC
Linnton Terminal
11400 NW St. Helens Road
Linnton, Oregon

DATE	PROJECT	FIGURE
8/28/02	B30-01H	3



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GEOLOGIC CROSS SECTION B - B'

Kinder Morgan Liquid Terminals LLC
Linnton Terminal
11400 NW St. Helens Road
Portland, Oregon

DATE	PROJECT	FIGURE
05/07/02	B30-01H	4